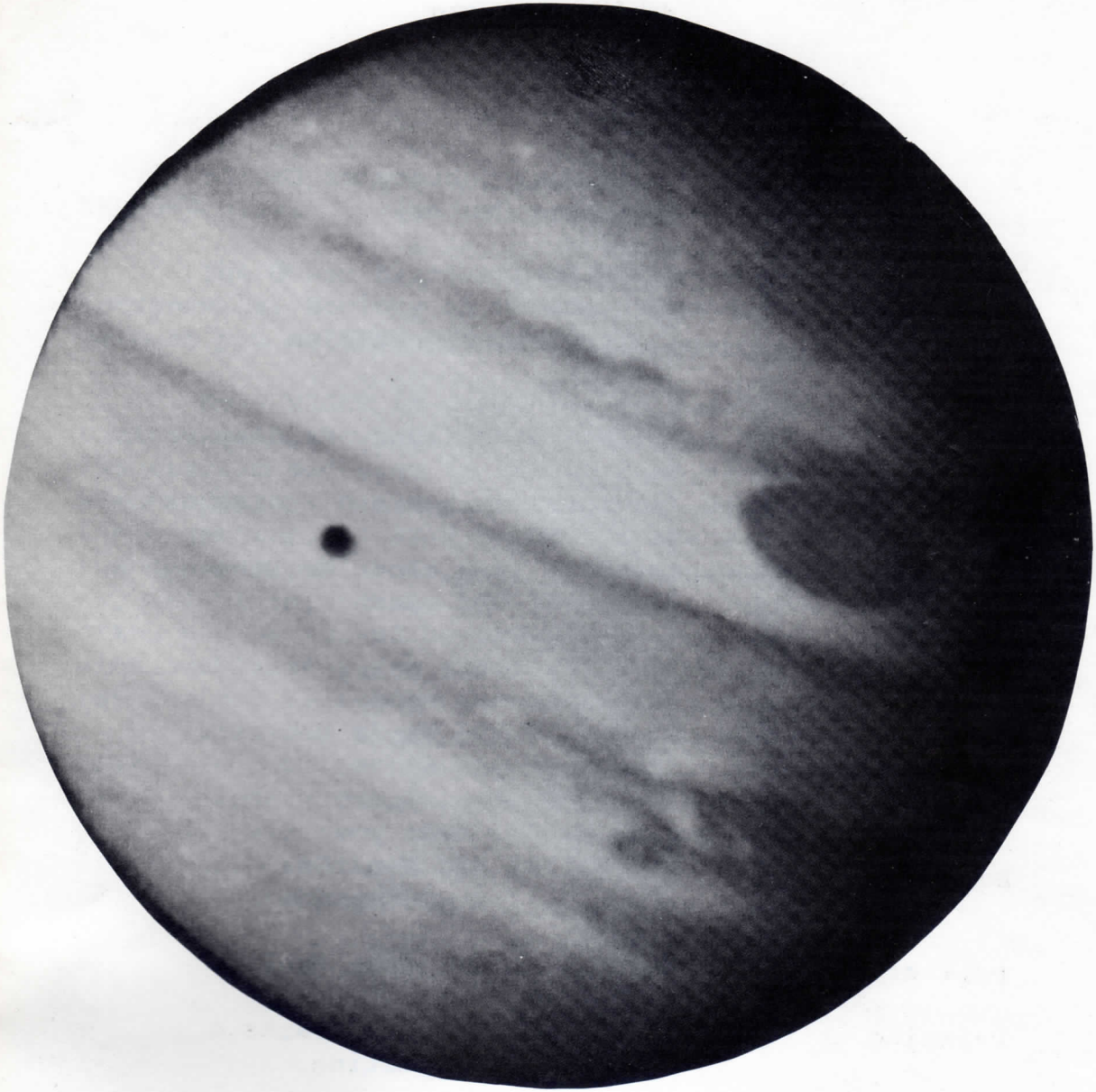

STAR NIGHT

STAR NIGHT '74

Hosted By

The Royal Astronomical Society of Canada
(Edmonton Center)

and

The Queen Elizabeth Planetarium

Chairman	Dr. Gary Prideaux
Amateur Astronomy	Mr. Franklin Loehde
Professional Astronomy	Dr. Douglas Hube Dr. Jack Winzer
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Brochure	Mr. Paul Deans Mrs. Kay Edwards
Publicity	Mr. John Hault
Printing	Edmonton Parks & Recreation

WELCOME.....

The Queen Elizabeth Planetarium and the Royal Astronomical Society of Canada, Edmonton Centre, welcome you to STAR NIGHT '74.

STAR NIGHT is presented to familiarize Edmontonians with the facilities available at their Planetarium and also to inform them of the work of Edmonton's amateur and professional astronomers. The organizers of STAR NIGHT '74 are well aware that the general public is very much interested in the sky and its mysteries and that their curiosity is often not satisfied by newspapers and television. With our literature, displays, audio-visual presentations and telescope demonstrations we of the planetarium and the R.A.S.C. hope to answer the questions some people may have and to whet the curiosity of other people. We hope to demonstrate to you that astronomy need not be an expensive or difficult hobby but can be, in fact, a very rewarding and enjoyable pastime.

AMATEUR OBSERVATIONAL ASTRONOMY

The amateur astronomer is in the unique position of being able to make a substantial contribution to our understanding of the universe by working with the professional in a great many observational fields. Many of these fields require little or no sophisticated equipment. The following is a list of observational fields in which the amateur astronomer can become actively involved.

NAKED-EYE ASTRONOMY

1. Meteor Counts: Acting individually or in groups amateurs can aid the professional by making counts of meteor appearances during known time periods. The sighting of especially bright meteors or fireballs are valuable if the time of the event is recorded, the position of the meteor's path with respect to the stars, its brightness and if any sounds are heard. Recovery of the meteorite may be possible.
2. Aurora Borealis: This observational field is especially suited to Edmonton Observers. The time of the display, its elevation above the horizon and the forms and colours present should be noted.
3. Solar and Lunar Eclipses:
4. Nova Search: Special areas of the sky are regularly checked for the appearance of new exploding stars.

BINOCULAR ASTRONOMY

1. Comet Search: Generally the northern horizon during the spring, summer and fall seasons is examined for comets that are too close to the sun for more southerly observers.
2. Variable Stars: Many stars periodically change their brightness and so are checked against fixed magnitude stars.

TELESCOPIC ASTRONOMY

1. Variable Stars: The most advanced observational field for the amateur.
2. Comet Search: As above but with telescope enabling much fainter comets to be seen or discovered.
3. Lunar Occultations:
   a) Solid: The timing of an eclipse of a star by the moon requires a telescope, stopwatch and shortwave radio.
   b) Grazes: The spectacular disappearance and reappearance of a star "skirting" the mountains of the moon.
4. Lunar Observing: A systematic search of the lunar surface for unusual features by sketching or photographing.
5. Planetary: Drawings are made of the surface and atmospheric features of the planets.
6. Sunspots: A daily count is made of sunspots and sunspot groups.

RADIO ASTRONOMY: The universe can be heard as well as seen.

AMATEUR TELESCOPE MAKING

Amateur telescope making is as old as the telescope itself. Early astronomers made their own instruments because they were the first to make telescopes. Few of the scientific pioneers did not make some contribution to telescope optics. Galileo, Christian Huygens and Isaac Newton worked in hte 17th century. The Herschel's, William and John, were the most celebrated astronomers and telescope makers of the 18th and 19th centuries. The largest telescope of the 19th Century was the Earl of Rosse's seventy-two inch and that telescope is still the largest ever used solely for visual observation.

Reflectors prior to 1860 had mirrors of speculum metal, an alloy of tin and zinc, which is brittle and of low reflectivity. Silver on glass mirrors were first made by Liebeg and the introduction of these mirrors increased the efficiency of reflectors by 2½ times due to the high reflectivity

of silver. After that time rapid advances in glass-making technology and in optical testing brought a great improvement in telescope performance. The most significant modern development for the amateur has been aluminizing for mirrors in place of silver which needed renewing every 3 to 6 months. Aluminum films are good after even 5 years.

Amateurs in the past have led the professional telescope maker in standards of precision and performance. Many of the finest opticians started making telescopes as amateurs and found themselves doing better work than the professionals of their day. It is true today as well that if one wants a nearly perfect telescope it must be built by oneself. Only an amateur can afford the time required to obtain the necessary precision. Amateurs today construct the complete range of telescope types, refractors, reflectors, compound reflectors, lens-mirror combinations and Schmidt telescopes. Beginners at telescope making most often construct Newtonian reflectors as their first effort. Six to eight inches is average size and these are convenient sizes to work. Kits which contain everything needed are available but if more than one telescope is contemplated it is better to buy materials separately. In any case, time is the largest investment in telescope making and no one should expect to finish a telescope quickly. Books on the subject are available in the libraries and should be consulted before beginning.

The sixth President of the United States is credited with the rather astonishing statement that one can judge the culture of a nation by the condition of its astronomical observatories.

ASTROPHOTOGRAPHY

Many pleasing celestial photographs may be obtained without resorting to telescopes, super lenses, tracking devices and other pieces of equipment usually associated with astrophotography. A good camera, a sturdy mount and a judicious selection of a film can result in many interesting photographs of various heavenly happenings. Following is a brief summary of ideas dealing with simply astrophotography.

Although almost any type of camera can be used, one with an adjustable shutter and the ability to take a time exposure photo is best. Since the widest range of commercial films are in 35 mm format, an instrument which will take this type of film is preferred. While opportunities for skyshooting exist for cameras without these features, the number of celestial events available for photographing is small.

There exists today a wide range of film from which to choose. Generally for this method of picture-taking, the faster the film (the higher the ASA number) the better. If colour slides are preferred, High Speed Ektachrome (ADA 160) or Afga (ASA 500) are probably the fastest films that are easily available. If black and white prints are acceptable try Plus-x (ASA 125), Tri-x (ASA 400) or 2475 Recording Film (ASA of about 1000) for very high speed photos.

The heavens provide a constant source of photographic material which can be easily recorded. Star trails are simple to obtain as the camera is aimed at a group of stars and the shutter left open for 30 minutes or more. Stars near Polaris will show circular trails while stars further south will have near horizontal tracks. This easy-to-operate setup can be used for several experiments...recording the light drop of variable stars, drawing constellation outlines, catching the passage of a satellite, and perhaps recording the appearance of a meteor. (If attempting to photograph a meteor, the best idea is to wait until a meteor shower occurs, and aim the camera towards the constellation where the meteors appear to originate). These activities can be completed using almost any type of film and they can be done anytime. The aurora is a little trickier to catch. Colour films bring out the variety of colours often found in the Northern Lights. Exposure

times should be varied from less than 1 second up to a few minutes. Edmonton, by the way, is well situated for aurora and many displays are often visible during the winter months. Of course, don't forget daylight events such as rainbows, and sundogs, objects that anyone can record using any type of camera.

It is possible to take photos of stars and have them appear as almost perfect dots of light without employing tracking equipment. By using 2475 Recording Film (which is a B & W print film), and by limiting the exposures to 25 seconds for stars near the pole and 15 seconds for stars near the celestial equator, a surprising number of stars can be recorded without the trails characteristic of longer exposures. This technique can be used for photographing individual constellations, making mosaics of the Milky Way, and for recording any bright comets that may appear.

Eclipses are special events which require different techniques. A lunar eclipse can be photographed without any sort of telephoto lens. A series of pictures using colour film with a 1 to 10 second exposure time will show the bright glaring full moon becoming redder and redder as it is eclipsed. A total eclipse of the sun is a much more spectacular sight, but is also much rarer for an observer who is not willing to travel to see one. Although there are many different aspects of the eclipse which can be photographed only with proper equipment, excellent pictures of totality have been obtained with nothing more than a hand-held Instamatic.

What can you do with the film if you cannot develop it yourself? Firstly, don't buy film from the drugstore, go directly to a commercial developer. Also don't buy film that has to be sent away to be developed. If possible talk to the manager and make sure it is understood that your otherwise blank negatives actually contain a wealth of detail. Make sure that any special instructions you have are written down by the developer. Have everything developed first, and later make slides or prints of the best results. (This also saves you money). If you find a good place, stick with it and they will eventually get to know you and what you want.

PROFESSIONAL ASTRONOMY

The Science of Astronomy: Astronomy is the science which deals with the relative positions and motions, the brightnesses, distances, constitution, physical condition, mutual relations, history and destiny (evolution) of the heavenly bodies, including the Sun and Moon and other members of the Solar System, the stars, nebulae (clouds of gas and dust), star clusters of galaxies which make up the physical universe. The astronomer, therefore, must be prepared to study the most extreme physical conditions imaginable.

Nature of the Work: The classic picture of an astronomer perched on a mountain top and gazing through his telescope no longer applies, if it ever did. Many active astronomers never use a telescope, their research tools being mathematics and the computer. Others find that a few nights observing will provide data that may require many months to analyze. Modern observing is rarely visual but, rather, involves the application of photographic, photometric and spectroscopic techniques to the study of celestial phenomena. The wide variety of phenomena studied by astronomers require many different approaches to their elucidation in the form of an acceptable physical model.

Preparation: The minimum preparation for a career as a professional astronomer is an undergraduate program which emphasizes physics and mathematics, followed by four or more years in a graduate program leading to the Ph.D. degree. Normally, an additional one or two years are spent as a postdoctoral fellow before taking a permanent position.

Employment: Following completion of such a program an astronomer may find employment in a university where he conducts research and teaches, at a government laboratory where his time is spent almost exclusively on research, or in a planetarium if he, or she, has a special interest and aptitude for teaching and public speaking.

Rewards: While the professional astronomer will not accumulate great material or financial wealth through his work (although he will earn a salary commensurate with his training, experience and responsibilities), he has the satisfaction of knowing that he may contribute some link in the succession of discoveries that will lead to the unravelling of the mysteries of the universe.

ASTRONOMY IN CANADA

Number of Astronomers: At the present time, approximately 150 persons are employed full-time as professional astronomers in Canada. Many are employed by the National Research Astrophysical Observatory in Victoria, the Algonquin Radio Observatory, the Dominion Radio Astrophysical Observatory near Pentiction, and elsewhere. Most Canadian universities have either a separate department of astronomy (Toronto, Western Ontario, UBC) or have one or more astronomers on staff in their departments of physics or mathematics (Alberta, Calgary, Victoria, Waterloo, Brandon, Queen's, St. Mary's, etc.).

Canadian Telescopes: The largest optical telescope in Canada is the 74-inch diameter reflector of the David Dunlap Observatory north of Toronto. There are 72- and 48-inch telescopes near Victoria, a 48-inch near London, Ontario, and many 24- and 16-inch telescopes at other locations. A Canadian-owned 24-inch telescope is operated on Las Campanas in Chile. The largest Canadian radio telescope is 150 feet in diameter and located in Algonquin Park, Ontario. There is an 85-foot dish near Penticton, B.C. Most of these telescopes are open to public view during restricted visiting hours.

A New Giant Telescope For Canada: Early in 1973 after several years of detailed study and discussion, agreement was reached and government support announced for the construction of a 3.6 meter (141 inches) diameter optical telescope as a joint project of Canadian, French and Hawaiian astronomers. The telescope will be located on Mauna Kea, Hawaii, at an elevation of 13,730 feet. This is one of the finest observing sites on Earth. The principal optical components are currently being figured at the Dominion Astrophysical Observatory, Victoria, B.C. When completed in late 1978 (at a cost of at least $20 million), this instrument will be one of the half dozen largest telescopes in the world, and will provide an important stimulus to the further development of Canadian astronomy.

ASTRONOMY AT THE UNIVERSITY OF ALBERTA

Staff and Facilities: Research and teaching in astronomy and astrophysics is conducted by members of the academic staff of the University of Alberta in the Department of Physics (observational astronomy, theoretical astrophysics, laboratory astrophysics) and in the Department of Electrical Engineering (radio astronomy). Programs leading to undergraduate and graduate degrees are open to qualified students Research facilities include a 12-inch optical telescope (a 16-inch is on order), radio telescopes, one of the largest computers in Canada, and a wide variety of laboratory devices such as spectrographs and linear accelerators. In addition, graduate students and faculty frequently use research facilities at other institutions in Canada and around the world.

Undergraduate Courses: The Department of Physics offers several undergraduate courses in astronomy and astrophysics. Some are directed toward students majoring in a physical science: Astro 253, Astro 410, Phys 563, Phys 565. Others basically survey courses of a descriptive nature, are available to students in other faculties such as Arts and Education: Astro 253, Astro 353.

Extension Course: Through the Department of Extension, an evening course entitled Astronomy Today - Our Place in the Universe is offered to the general public. Many subjects of current interest (quasars, pulsars, black holes, planetary probes, extra-terrestrial life, etc.) will be discussed during the ten 2-hour sessions which begin on Tuesday, October 8, 1974. Further information is available from the Department of Extension (telephone 432-3116).

VARIABLE STAR OBSERVING

While most stars shine with a constant brightness, there are some whose brightness varies with time. Some of these variable stars have proven to be extremely important to astronomy, serving as fundamental yardsticks for measuring distances in the universe, or providing insights into such physical quantities as the size and weight of stars. There are many thousands of variable stars known. Although many have been studied by professional astronomers, there are still many that require additional observations.

One of the more rewarding fields of amateur astronomy is the observation of these variable stars. In this field of endeavor, the amateur can make a significant contribution to astronomy. The instrumentation required is minimal: often a pair of binoculars is sufficient. When observations are made under the guidance of the American Association of Variable Star Observers (AAVSO), the results from many amateur observers can be compiled and made available to professional astronomers. A very important contribution to astronomy has been made by AAVSO observers over the past half century in the study of semi-regular and irregular variables. These are stars for which systematic observations are too time consuming to be undertaken by professional astronomers.

How difficult is it to observe variable stars? Actually it is quite simple. First the star is located and identified using finding charts provided by the AAVSO. The brightness of the variable is estimated by comparing it with several other stars of known brightness (listed on the observing chart). Finally, the time and date of observation are recorded.

SPACE EXPLORATION

The 1960's were an immensely exciting decade in space exploration spanning the years from the earliest, primitive satellites to Apollo 11 on the Moon. But during the 1970's the emphasis has switched to unmanned study of the planets, including our Earth. A new generation of sophisticated spacecraft have spearheaded the search for knowledge about our nearby planetary neighbours.

The planet Mars has been the centre of much attention throughout the space-age as many probes have gazed down upon its crater-strewn surface. Mariner 9, which circled the planet for one year beginning in November 1971, was able to take high resolution photos of the entire surface. These pictures revealed four large volcanoes, a vast chasm which stretches nearly 3,000 miles, and many small channels.

The most remote planet reached by robot spaceprobes is Jupiter which was visited by Pioneer 10 in December of '73. After a journey of 21 months covering half a billion miles Pioneer swept past the giant planet at a distance of only 81,000 miles. The craft made various measurements and took photographs which revealed Jupiter's Great Red Spot to be a gigantic storm. A sister ship Pioneer 11 is now heading towards a rendezvous with Jupiter in December '74 and will move on to intercept Saturn in late 1979.

Mariner 10 is the latest craft to examine the distant worlds. The probe flew past Venus in February 1974 and moved on to intercept Mercury almost two months later. The clouds that completely blanket the planet were found to be very complex in nature. Wind speeds up to 225 miles per hour were also noted and it appears that most of the clouds near the equator circle the planet once every four days. Mercury's surface was seen to be very rugged and quite similar to the lunar surface. One feature found on Mercury and not on the Moon was a number of scarps or ridges, some of which are more than 300 miles long. One unexpected find was the discovery that Mercury has a small magnetic field. The orbit of Mariner 10 is such that on September 21 the craft will encounter Mercury again. Its cameras will be turned on and the South Polar region will be photographed.

QUEEN ELIZABETH PLANETARIUM

The Queen Elizabeth Planetarium was built by the citizens of the City of Edmonton to commemorate the 1959 royal visit of Her Majesty Queen Elizabeth and Prince Philip.

Officially opened in October, 1960 the Planetarium became the first such facility in Canada devoted to the popularization of astronomy. Since that time hundreds of thousands of visitors have attended the Planetarium programmes making the unit an important part of Edmonton Parks and Recreation's Leisure and Environmental Services.

The heart of the Star Theatre is the "Star Projector". Manuactured by the Goto Optical Company of Toyko the 'Venus' projects some 2,800 stars through thirty-two optical systems as well as projecting the Sun, Moon and the five naked-eye Planets of our Solar System.

With the incredibly complex instrument the audience may view the evening sky as seen from any point on the surface of the Earth while passing through any time sequence; as small as a minute or as large as an eon. The Star Projector is complemented by a battery of 35 mm slide projectors and movie systems as well as highly specialized effects projectors. The visual system is backed by the finest of sound systems.

The Planetarium is in essence the ultimate form of Multi-Media Theatre. Each production is a dramatic blend of the astronomer's knowledge and the talents of writers, artists and technicians. The end result is a programme which is not only educational but also entertaining, sometimes serious, sometimes amusing!

THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

Anyone who is interested in one of the many facets of astronomy; whether it be star-gazing, telescope making, Astronomical or Space Science theory, can find an opportunity for sharing and increasing those interests by becoming associated with the Royal Astronomical Society of Canada, Edmonton Center. Membership in this Center entitles one to full privileges as a member of the R.A.S.C., which has its National Headquarters in Toronto, Ontario. The R.A.S.C. includes both professionals and amateurs and has centers in major cities across Canada.

Meetings of the Center are normally held on the second Monday of each month (from October to May inclusive), at 8:00 P.M., in the Queen Elizabeth Planetarium. These meetings feature guest speakers including astronomers, radio astronomers, spacecraft designers and NASA project scientists. In addition to these regular meetings, we organize each year a September observing session or Starnight, a June picnic and a banquet held in November. This year's speakers and topics include:

"The Polluted Stars" — presented by Dr. Jack Winzer.

"The Last Question" — a Planetarium show based on the story by Dr. Isaac Asimov.

"Collapsed Stars" — presented by Dr. D.P. Hube.

"Here, There, & Everywhere" — presented by Paul Deans.

Annual Exchange Speaker — courtesy of the Calgary Center of the R.A.S.C.

Membership in the RASC includes complementary admission to the Queen Elizabeth Planetarium. RASC members also receive the annual RASC Observer's Handbook; Stardust, the monthly bulletin of the Edmonton Center and the Journal of the National RASC published bi-monthly.

ANGUS SMITH TELESCOPE

The 12½ inch reflecting telescope located on the patio in front of the Queen Elizabeth Planetarium was donated by Mrs. Margaret Smith, wife of the late Angus Smith (1931-1972). The reflector, built by Angus, was formerly mounted above his garage in south-west Edmonton. The telescope will be made fully portable for use by the planetarium as a mobile observatory. Accurate timings of total and grazing occultations will be one of its prime functions.

Mr. Smith became interested in astronomy at an early age and built several different telescopes. He joined the Edmonton Center of the R.A.S.C. in 1962 and during the following 10 years he held, at one time or another, most of the executive offices of the Center. Angus was President in 1970 when Edmonton hosted the General Assembly of the R.A.S.C. His home and observatory were favorite meeting places for all those interested in astronomy, and many of the younger members of the Center got their first good look at the heavens through his telescope. Angus' reflector will, in the future, continue to acquaint many people with the splendor that can be found in the heavens.

TELESCOPIC VIEWING

If you have ever wanted to look through a good telescope, now is the time. Weather permitting, 8 or 9 telescopes will be set up in Coronation Park infront of the planetarium for Starnight. Each telescope will be aimed at a different object, thus providing views of a maximum number of fascinating celestial objects. The telescopes vary widely in size, structure and price as some are home-built while others were purchased from commercial telescope-makers.

THE STAR-SPLITER by Robert Frost

'You know Orion always comes up sideways.
Throwing a leg up over our fence of mountains,
And rising on his hands, he looks in on me
Busy outdoors by lantern-light with something
I should have done by daylight, and indeed,
After the ground is frozen, I should have done
Before it froze, and a gust flings a handful
Of waste leaves at my smoky lantern chimney
To make fun of my way of doing things,
Or else fun of Orion's having caught me.
Has a man, I should like to ask, no rights
These forces are obliged to pay respect to?'
So Brad McLaughlin mingled reckless talk
Of heavenly stars with hugger-mugger farming,
Till having failed at hugger-mugger farming,
He burned his house down for the fire insurance
And spent the proceeds on a telescope
To satisfy a life-long curiosity
About our place among the infinities....

Today it is no longer necessary to burn down your house for the fire insurance to be able to take up astronomy as a hobby. For the beginning amateur, a good pair of binoculars often have better optics than some "astronomical" telescopes of a small size. However at some point a telescope is usually desired, but care should be taken in its selection. Before such a major purchase, it is often best to consult with someone knowledgeable of telescopes in order to avoid being disappointed with the instrument.

APPLICATION FOR MEMBERSHIP

ROYAL ASTRONOMICAL SOCIETY OF CANADA
EDMONTON CENTRE

NAME: _____

ADDRESS: _____
_____
_____

TELEPHONE: _____

INTERESTS: _____
_____
_____

Students (Under 18 years)	$8.50
Adults	$13.50
Life Member	$150.00

EQUIPMENT: _____
_____
_____

All memberships include:
The Observer's Handbook (published yearly)
Journal of the R.A.S.C. (published bi-monthly)
Stardust (published monthly by the Edmonton Centre)

For further information, please call the planetarium at 455-0119 or write to: Queen Elizabeth Planetarium
10th Floor, C.N. Tower
City of Edmonton

THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

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THE QUEEN ELIZABETH PLANETARIUM

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Secretarial and Administrative Services	Mrs. Kay Edwards
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	Miss Peggy Holmes
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	Mr. Tom Morrison
Special Narrator	Mr. Wilf Rowe

Front Cover -- Jupiter From Pioneer 10
Back Cover -- Mercury From Mariner 10